

## **Actual abilities of breast disease screening**

I.I. Smolanka, S.Yu. Skliar, T.S. Golovko, O.V. Ganich

National cancer institute

**Summary.** Considered an update recommendations for screening assessment of pathological breast lesions or cancer. Present world system for the breast diagnosis reporting with appropriate recommendations for use (BI-RADS categories).

**Key words:** breast cancer, screening, preventive examinations, early detection of cancer.

One of the most characteristic features of the spread of malignant tumors among women in economically developed countries is a significant increase in the frequency of breast cancer (BC), which occupies a leading position in the structure of cancer morbidity and mortality.

In the structure of cancer morbidity of women in Ukraine BC also ranks the first place [1]. There are registered more than 140,000 women with BC in cancer care facilities in Ukraine, and each year are registered about 17 thousand new cases of BC.

Despite the fact that malignant tumors of breast are related to visual localization according to the National Cancer Registry of Ukraine, abandoned cases of BC are in 2012 20.5%, and in some regions this index is over 30 % [1]. On periodic health examinations in Ukraine appears to be up to 47.6 % of patients with BC, but the index in some regions is up to 25 %. Special treatment reached 83.4 % of newly diagnosed patients (from 70.6 % to 97.4% in some regions). [1] But shortcomings in the medical diagnostic process cause the death from this pathology during the first year in 10.8% of patients (in the USA – less than 2%). It is known that treatment of neglected forms of BC leads to increased costs in 25-30 times compared with when the tumor is detected at early or preclinical stages. So, great urgency is early detection, which improves the survival of patients with BC and significantly reduces the cost of anticancer treatment [3-6].

The stage of the development of tumor remains the most important determinant of clinical outcome of breast cancer in women. There is a high correlation between tumor size and extent of tumor spread to axillary lymph nodes. This means that the ideal mode of screening for detection of breast cancer – a mode that can detect a tumor before it is large enough to be detected by palpation.

Effective ways of improvement the detection of malignant breast tumors on early stages all over the world is the introduction of screening programs. We know that through the introduction of state screening programs in developed countries over the last 15 years was reduced mortality from BC in 25-30 %. The results of many randomized trials, that were conducted to determine the necessity of screening examinations in women of different age groups, showed a significant reduction in mortality in the group of patients aged 50-69 years. As a result of meta-analysis was found a decrease in the number of deaths due to BC in the group of women 50-59 years – 14% and in the group of women 60-69 years – 32%. We also know that around the world a peak incidence of BC is in the age of 50-75 years. So, now it is recommended the widespread use of screening mammography in women mainly in the age group of 50-70 years. The definition of “screening” and justification for its use is provided in article No.4 (2013) of the journal “Clinical Oncology” [2].

Decision about screening concerning separate group of population and individual patient to identify specific disease always involves assessment of the benefits and costs/disadvantages. In case of screening for detection of breast cancer, the most important advantage is the reduction in risk of death and the number of years of life gained. Costs include financial and other costs – uncomfortable feelings are directly related to the conditions of screening (risk of exposure, pain, discomfort and anxiety), further diagnostic studies after receiving false positive results and overdiagnosis (detection of cancer, which would have never manifested clinically). Value of performance and costs vary considerably depends on the age of the patient. In developed countries, there are different programs of screening of BC, their features are related to the organizational

structure of health care in the country, their interpretation remains controversial, but the main goal of all the mentioned programs is to reduce mortality through the early diagnosis of BC. The right planning of conducting the screening programs allows to improve 5-year survival with BC more than 30%. None of the known treatments has such efficiency.

In the world the “gold standard” of screening of breast disease is mammography (probability of diagnostic tests up to 92%). At the present stage **the strategy of screening program** for BC is accepted: age – over 50 years, the interval between surveys – 2 years, 2 projections of each breast, one reading of mammograms (single reader), (New England Journal of Medicine 365:11, [www.nejm.org](http://www.nejm.org)).

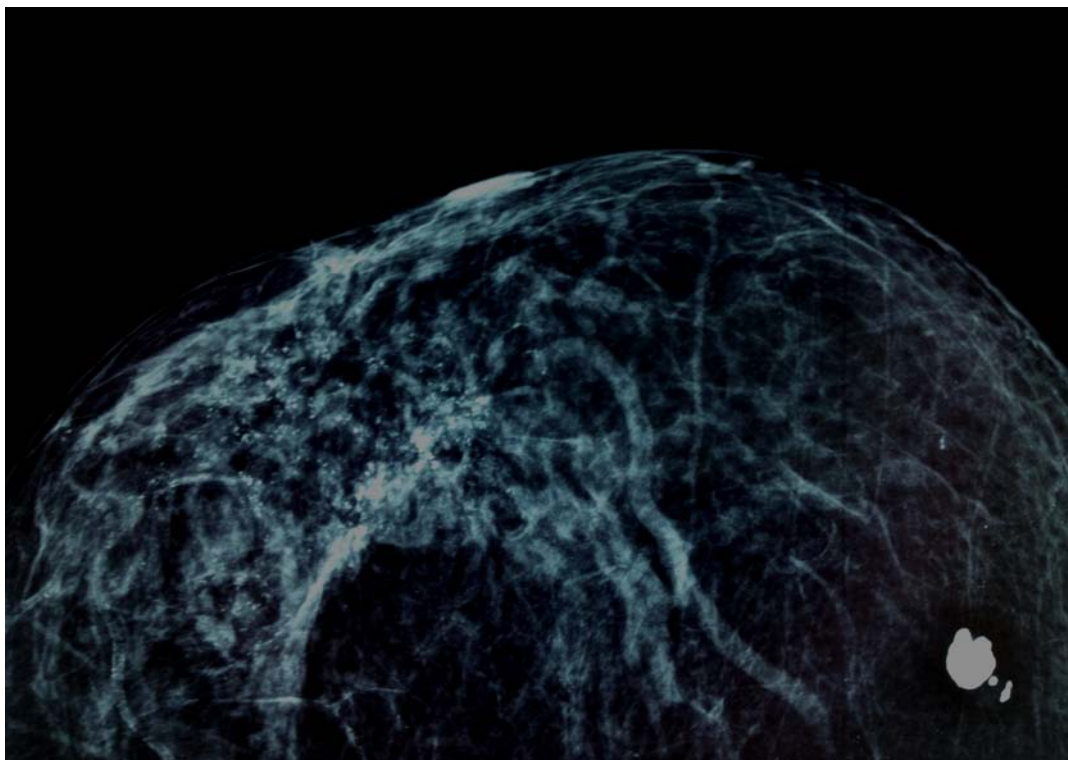
**Mammography examination** – usually includes 2 x-ray pictures of each breast (i.e. one picture is taken from above [craniocaudal projection] and another picture is taken on the side [mediolateral oblique projection]). The results, obtained during the randomized clinical trials, have shown that screening mammography reduces mortality from breast cancer; the registered total sensitivity is 85 %. The technical aspects of mammography may influence the results of the test. Digital mammography is different from conventional film mammography that the previous generates electronic image of the breast and allows you to store information on your computer and conduct further manipulation with it. Digital mammography is more accurate in women with dense breasts, film mammography – in women aged 65 years and older.

In areas where there are enough doctors mammologists screening mammography is a radiological study to identify at an early stage “hidden” BC in women who have no symptoms. In addition, the study is to divide the patients into two groups of women – with low and high risk of disease. Results can convince most women that no significant abnormalities were found in them, while others must be said that the abnormalities are, and they need further examination. Of course studies are limited by angular projections of craniocaudal and mediolateral area of each breast. Sometimes, for optimal visualization of breast tissue are

needed more projections, but they must not be done routinely. Where there is a suspicion of pathology, it is offered further imaging studies, diagnostic mammography or biopsy.

The purpose of all mammographic studies is to help identify preclinical forms of BC but unlike mammography screening, mammography study of breast cancer to solve specific problems (diagnostic mammography and ancillary procedures) is directed to provide special analytical studies of patients with abnormalities, which were detected clinically or by screening. Diagnostic study of breast cancer should lead the doctor to the final conclusion on the clinical findings, to verify the diagnosis, allowing to provide specific recommendations for treatment.

The highest value of mammography as a method of screening of breast cancer can be demonstrated by the detection of pre-clinical forms of the disease, which manifests radiographically in the form of microcalcifications. None of the other known methods of diagnosis today can properly evaluate this condition in breast (see pic.1-3).



Picture 1. Multiple malignant polymorphic microcalcifications – breast cancer and fibroadenoma (lower angle on the right) with benign microcalcifications of type “popcorn”.



Picture 2. Malignant polymorphic microcalcifications – breast cancer.



Picture 3. Benign, solitary located, polymorphic microcalcifications on the background of diffuse fibrosing adenosis of the breast.

Today is adopted a unified system for the registration of results of mammograms with appropriate recommendations for each category. In these

recommendations is indicated the fourth edition of BI-RADS, to which was made significant changes and added the category 6. Evaluation categories of BI-RADS are related to the method of visualization when using one method of visualization (e.g. mammography), but the use of multiple methods of X-ray diagnostics (e.g., additional ultrasound diagnostics), categories of BI-RADS reflect total results of conducted studies. Thus, the total estimated category according to BI-RADS may vary depending on the results of subsequent visualization studies (i.e., estimated category according to BI-RADS, including some mammographic studies, may increase, decrease or remain unchanged during diagnostic ultrasound studies). If as the result of visualization were revealed numerous diseases, general category of final score according to BI-RADS is based on present results, causing the greatest concern.

After completing mammographic examination, results are classified according to one of the following categories of **BI-RADS**:

- **Category 1 – Negative result:** This is a mammogram with negative result. Breast – symmetrical, without space-occupying formations, violation of architectonics or suspicious calcifications.

- **Category 2 – Benign change(s):** This is also a mammogram with negative result, but it can be marked with changes that suggest a benign formation. Typical cases include calcifications that look like benign formations, such as calcified fibroadenoma, cyst with fat content or lipoma. The specialist, performing the interpretation of results, can also describe intramammary lymph nodes, phenomenon of vascular calcification, presence of implants or violation of architectonics that are directly related to the previous surgery, and at the same time conclude the absence of signs of malignant process according to mammography data.

- **Category 3 – Probably benign formation – is recommended follow-up after a short time:** This is a mammogram, which usually shows a benign formation. It is recommended careful monitoring of result to ensure its stability. The risk of possible presence of malignant tumor is assessed as being less than 2%.

- **Category 4 – Suspicion for malignant formation – it is necessary to consider biopsy:** These abnormal formations are related to the category that is characterized by a large range of probabilities that they are malignant, but from data of mammograms it is impossible to conclude their obvious malignant nature. Risk of having a malignant formation is greatly variable, and is higher than that in category 3, but lower than the risk of category 5.

- **Category 5 – Detected signs indicate a high probability for the presence of malignant formation – it is necessary to take appropriate measures:** There is a high probability (> 95%) that these abnormal formations are malignant tumors. They include spin space-occupying formation or pleomorphic calcifications that look like malignant formation, etc.

- **Category 6 – Verified diagnosis –presence of a malignant tumor is confirmed by biopsy results – it is necessary to take appropriate measures:** This category has been added in this edition regarding pathological formations in breast, detected with the help of visualization study with subsequent verification of diagnosis as malignant formation according to the biopsy, but before the radical treatment.

There is another category of BI-RADS – **Category 0** – indicating the incomplete, unfinished assessment. Category 0 is defined as: **required additional visualization study and / or previously received mammograms for comparison:** It is defined as a result that needs further evaluation. This category is almost always used in the context of screening. Recommendation for additional visualization study may involve sighting mammographic examination with compression, with increasing of image, special angles of mammographic images and conduction of ultrasound, but not limited to. Under certain circumstances, this category can be used after a full mammographic examination. In all possible cases where the results of the study are not negative and if there were not revealed typical benign tumors, this test should be compared with the results of previous studies. Radiologist must decide concerning results from what previous studies should try to get.

***Guidelines for interpretation the results of mammography and test surveys:***

Regarding categories of BI-RADS 1 and 2, in which results of mammograms are quite normal or is concluded that formation is benign, based on mammogram, it is recommended the conduction of routine screening through 2 streams. If the results of screening mammography indicate pathological changes, radiologist should try to get mammograms that were obtained earlier in previous mammographic examinations. This is the most important with regard to pathological formations causing slight suspicion on the results of mammography. If after comparison the photos there is still questionable area that is not clearly benign formation, in that case should be conducted diagnostic mammography examination with an ultrasound or not.

For control evaluation of patients, as a result of a survey of which were obtained mammograms, are classified under categories 0-3 or higher according to classification of BI-RADS.

**Diagnostic examination in patients with positive results:**

Further examination of individual patients who received positive results may include diagnostic mammography examination, ultrasound and tissue sampling tests (trepan-biopsy).

**Diagnostic mammography.**

Screening mammography, which includes 2 standard x-rays of each breast, differs from diagnostic mammography in that the latter is used for the assessment of patient's state with positive clinical judgment – such as breast tumor or detected pathology on screening mammogram. Diagnostic mammogram involves additional photos, including sighting shots with compression or pictures with enlarged image for investigation of suspicious areas.

These recommendations are aimed at providing health care professionals with practical harmonized rules on preventive examinations and evaluation of a number of pathological formations of the breast. It is necessary to remember that clinical assessment should is always an important part of optimal management of patients with suspected breast cancer formation. If the results of physical examination of



the breast, X-ray imaging and histological/cytological examinations are not consistent with each other, clinician should carefully assess the patient's condition and decide on the need for further supervision, examination or treatment.

### References

1. Федоренко З.П., Михайлович Ю.Й., Гулак Л.О. и др. (2013) Рак в Україні, 2011-2012. Бюлетень Національного канцер-реєстру України; 14: 120.
2. Смоланка І.І., Скляр С.Ю., Головка Т.С., Ганіч О.В. (2013) Скринінг, профілактика та рання діагностика раку грудної залози. Клиническая онкология; 4 (12): 46-50.
3. Warner E. (2011) Screening of breast cancer. N. Engl. J. Med.; 365: 1025-1032.
4. Bevers T.B. (2008) Ultrasound for the screening of breast cancer. Curr. Oncol. Rep.; 10: 527-528.
5. Armstrong K., Moye E., Williams S. et al. (2007) Screening mammography in women 40 to 49 years of age: a systematic review for the American College of Physicians. Ann. Intern. Med.; 146: 516-526.
6. Berg W.A., Blume J.D., Cormack J.B. et al. (2005) Combined screening with ultrasound and mammography vs mammography alone in women at elevated risk of breast cancer. J. Clin. Oncol.; 23: 8469-8476.